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FORM PTO-1390 (Modified) (REV 11-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: **P25204 USA**

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.5): 09/869006

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/IT00/00426	**23 October 2000**	**22 October 1999**

TITLE OF INVENTION

METHODS AND EQUIPMENT FOR THE MEASUREMENT OF THE THREE-DIMENSIONAL DISTRIBUTION OF THE TEMPERATURES WITHIN DIELECTRIC MEANS

APPLICANT(S) FOR DO/EO/US

Giuseppe Chidichimo et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include itens (5), (6), (9) and (24) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
   - b. ☒ has been communicated by the International Bureau.
   - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   - a. ☒ is attached hereto.
   - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   - b. ☐ have been communicated by the International Bureau.
   - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail
23. ☐ Other items or information:

531 Rec'd PCT/PTO 22 JUN 2001

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.5) 09/869006	INTERNATIONAL APPLICATION NO. PCT/IT00/00426	ATTORNEY'S DOCKET NUMBER P25204 USA

24. The following fees are submitted:.	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :		
☒ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1000.00**		
☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$860.00**		
☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$710.00**		
☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690.00**		
☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =	**$1,000.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$0.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	12 - 20 =	0	x $18.00	**$0.00**	
Independent claims	1 - 3 =	0	x $80.00	**$0.00**	
Multiple Dependent Claims **(check if applicable).**			☐	**$0.00**	
TOTAL OF ABOVE CALCULATIONS =				**$1,000.00**	
☒ Applicant claims small entity status. (See 37 CFR 1.27). The fees indicated above are reduced by 1/2.				**$500.00**	
SUBTOTAL =				**$500.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +				**$0.00**	
TOTAL NATIONAL FEE =				**$500.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).** ☐				**$0.00**	
TOTAL FEES ENCLOSED =				**$500.00**	
				Amount to be: refunded	$
				charged	$

a. ☒ A check in the amount of **$500.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. ________ in the amount of ________ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **19-5425** A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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36,826

REGISTRATION NUMBER

6/22/01

DATE

09/869006

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNITED STATES DESIGNATED/ELECTED OFFICE

Applicants: G. Chidichimo et al.	GAU:
International Application PCT/IT00/00426	Examiner:
Int'l Filing Date: 23 October 2000	
For: METHODS AND EQUIPMENT FOR THE MEASUREMENT OF THE THREE-DIMENSIONAL DISTRIBUTION OF THE TEMPERATURES WITHIN DIELECTRIC MEANS	Atty. Docket No. 25,204 USA

Box PCT
Attn: DO/EO/US
Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Please amend the application as set forth below. The calculation of the filing fees should be based on the claims as amended herein.

In The Claims:

2. (Once Amended) Instruments for non invasive measurement of the three-dimensional distribution of the temperatures of the dielectric objects according to claim 1 characterised by the fact that the maps are supplied as a table.

3. (Once Amended) Instruments for non invasive measurement of the three-dimensional distribution of the dielectric objects according to claim 2 characterised by the fact that the maps are supplied on a screen.

4. (Once Amended) Instruments for non invasive measurement of the three-dimensional distribution of the temperatures of the dielectric objects according to claim 2 characterised by the fact that the maps are supplied as thermal maps.

5. (Once Amended) Non invasive measurement methods of the three-dimensional distribution of the temperatures of the dielectric objects using an instrument of the type according to claim 1 characterised by the fact that it uses a reconstructive approach of the point like temperatures based on the use of the Raley-Jeans or similar equations, that uses calculus algorithms of the three-dimensional thermal distribution may be based on models in which the link between the emission intensities and the temperature profiles are expressed through Fridgolm integrals equations or by other similar equations.

Please add the following new claims:

10 (new). Non invasive measurement methods of the three-dimensional distribution of the temperatures of the dielectric objects using an instrument of the type according to claim 2 characterised by the fact that it uses a reconstructive approach of the point like temperatures based on the use of the Raley-Jeans or similar equations, that uses calculus algorithms of the three-dimensional thermal distribution may be based on models in which the link between the emission intensities and the temperature profiles are expressed through Fridgolm integrals equations or by other similar equations.

11. (new). Non invasive measurement methods of the three-dimensional distribution of the temperatures of the dielectric objects using an instrument of the type according to claim 3 characterised by the fact that it uses a reconstructive approach of the point like temperatures based on the use of the Raley-Jeans or similar equations, that uses calculus algorithms of the three-dimensional thermal distribution may be based on models in which the link between the emission intensities and the temperature profiles are expressed through Fridgolm integrals equations or by other similar equations.

12. (new). Non invasive measurement methods of the three-dimensional distribution of the temperatures of the dielectric objects using an instrument of the type according to claim 4 characterised by the fact that it uses a reconstructive approach of the point like temperatures based on the use of the Raley-Jeans or similar equations, that uses calculus algorithms of the three-dimensional thermal distribution may be based on models in which the link between the emission intensities and the temperature profiles are expressed through Fridgolm integrals equations or by other similar equations.

Respectfully submitted,

June 22, 2001
Date

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GAH:pmf

VERSION WITH MARKINGS TO SHOW CHANGES MADE

2. (Once Amended) Instruments for non invasive measurement of the three-dimensional distribution of the temperatures of the dielectric objects according [the second] to claim <u>1</u> characterised by the fact that the maps are supplied as a table.

3. (Once Amended) Instruments for non invasive measurement of the three-dimensional distribution of the dielectric objects according to [the second] claim <u>2</u> characterised by the fact that the maps are supplied on a screen.

4. (Once Amended) Instruments for non invasive measurement of the three-dimensional distribution of the temperatures of the dielectric objects according to [the second] claim <u>2</u> characterised by the fact that the maps are supplied as thermal maps.

5. (Once Amended) Non invasive measurement methods of the three-dimensional distribution of the temperatures of the dielectric objects using an instrument of the type [described in any of the claims from 12 to 4] according to [the second] <u>claim 1</u> characterised by the fact that it uses a reconstructive approach of the point like temperatures based on the use of the Raley-Jeans or similar equations, that uses calculus algorithms of the three-dimensional thermal distribution may be based on models in which the link between the emission intensities and the temperature profiles are expressed through Fridgolm integrals equations or by other similar equations.

1/PRTS
EXPRESS MAIL LABEL No. EL663031748US
Attorney Docket No. P-25201 USA
09/869006
WO 01/29527
531 Rec'd PCT/PTO 22 JUN 2001
PCT/IT00/00426

METHODS AND EQUIPMENT FOR THE MEASUREMENT OF THE THREE-DIMENSIONAL DISTRIBUTION OF THE TEMPERATURES WITHIN DIELECTRIC MEANS

A new type of tomograph has been invented that is able to rebuild the three-dimensional distribution of the temperatures present within the dielectric objects, including biological objects. Although the instruments may be used in all fields, one of its most important uses is that which in the medical-diagnostic field, considering that it may allow the definition of the three-dimensional thermal map of human internal organs.

The instrument is made up of:

1. Electromagnetic wave emission sensors that are able to detect radiation with wave lengths that go from the millimetre, centimetre, and metre waves to those of the infrared radiation.
2. All structural elements and the mechanical and electronic accessories necessary to assemble and move the aforesaid sensors, so as that the sensors themselves can detect most suitably the heat emissions of the dielectric objects, according to the given directions and distances.
3. An electronic co-ordinator for the automatic management of the instruments.
4. Software for machine management and for the elaboration of the three-dimensional distributions of the temperatures in the dielectric objects.

DESCRIPTION OF THE PREVIOUS STATE OF THE ART

The present invention concerns an instrument and a methodology for the determination of the three-dimensional distribution of the temperatures of the dielectric objects, non invasively. . It is based on the possibility of measuring with extreme precision the electromagnetic heat emission that results within the internal presence of objects with temperatures superior to absolute zero. All bodies that are furnished with such temperature distributions irradiate electromagnetic radiation in accordance with the law of Plank: from a physical point of view there is thus a certain quantity of internal heat that is irradiated externally as electromagnetic radiation. The power emitted depends principally on the temperature of the body and on the emission properties of the same body. The electromagnetic wave emission power of the objects can be described as not very elevated frequencies (until the infrared zone) through Raley Jeans type equations and it proves hence to be directly proportional to:

- the square frequency
- the emission coefficient, between zero and one, that in turn depends on the frequency,
- the body temperature,
- the Boltzman constant.

The emission power however, at room temperature, reaches the maximum in the infrared zone, but decreases, exactly squarely as compared to the frequency, for lower frequencies. because of this, the detection of the power irradiated by the object in millimetre, centimetre and metre waves, becomes a much more critical problem and requires extremely sensible sensors. Surveys that are able to precisely measure the objects' emission power, in this frequency range, have become accessible in the last years. The first surveys, in this frequency field were the Dicke radiometres (1;2). However even these

sensors have not been greatly used because of the measurement errors introduced principally by the reflection of the irradiating power emitted by the objects on the level of the interface between the same objects and the surveyor's antenna. There have been various attempts to correct this undesired effect. An initial solution to the problem was presented by Ludeke et. Al. In 1978 (3). While more recently, more effective solutions were presented by Troitskii and Raklin (4), and Holodilov and Ulianichev (5). The latest generation of sensors, commonly defined as radiothermometers now allows to measure with extreme precision the physical temperature of the dielectric objects without errors caused by the reflection of the power that irradiates towards the interface between the object and the sensor antenna. In the radiothermometer proposed by these authors, the antenna is connected through a modulator of the first arm of a circulator. The second arm of this circulator is connected to the input of the radiometer. The radiometer has within itself a reference high tension generator that feeds the modulator. In this case a resistance, in thermal contact with the temperature transducer, is the noise generator. The output of the resistance is connected both to the output of the radiometer, through a high frequency de-coupling element (inducer), and to the third arm of the circulator through a fitting condenser. The radiometer stops feeding the resistance when its temperature is identical to the object's.

Ultimately the problem of detecting electromagnetic emission in the wave length field that goes from millimetres to meters can be considered solved and the present invention, that will use as electromagnetic radiation sensors the aforementioned radiometers, benefits from this.

The instrument object of the present invention requires the extension of the frequencies detectable until the infrared zone. This proves comprehensible if one considers that the penetration power of the electromagnetic waves in the dielectric objec ts is directly proportional to the wave lengths of the radiation, which in turn inversely depends on the square root of the dielectric constant of the intersected object. When it is required rebuild the internal temperature distribution of a determinate object it is therefore necessary to have at one's disposal detectors that are sensible to an ample range of frequencies so as that measuring the power irradiated in growing wave lengths, starting from infrared, deeper and deeper layers of the investigated object are gradually characterised. The necessity of extending the frequency field to the infrared is not a problem because the availability of the infrared sensors is much broader (6)

Even if the instrument, object of the present invention, is useable in all fields in which one wishes to determine the three-dimensional distribution of the temperatures within any dielectric object, a particular important application regards the building of three-dimensional thermal maps in human internal organs and from this point of view the instrument is of great interest for medical diagnostics. In order to illustrate the effect on the medical diagnostic sphere and the considerable innovation level, its use will be referred to as Radiomammograph that is as an apparatus that is able to produce three-dimensional thermal maps of internal sections of the breast. This internal organ is particularly exposed to tumour pathology attacks. Breast cancer is one of the main problems of modern oncology. At the moment the most used diagnostic method for a breast tumour is the X - ray mammography of which

have been seriously analysed both the use limitations and the diagnostic criteria. It is a universally recognised fact by this time that x-ray application in mammographs currently in use represents an important factor of tumour pathology induction. In 1997 the World Health Organisation has identified the Mammography as the third risk factor for breast cancer. Hence many important world health organisations such as the Department of Health Service (USA) and the National Cancer Institute (USA) urge the scientific world to develop new methods for the precocious diagnosis of breast cancer. For some years now the possibility of applying to the diagnosis of breast tumour techniques such as MRI (Magnetic Resonance Imaging) and PET (Positron Emission Tomography) has been experimented, that however the analysed organs to strong electromagnetic field whose effects on the cells are not completely known. Besides these methodologies, because of their expensiveness and the various limitations that they encounter, cannot be used for population prevention screening.

The mammography technique, in addition to the inconvenience represented by its intrinsic invasiveness and riskiness, presents still another important limiting factor: its low spatial resolution on soft tissues. In the case of breast cancer its is ver y difficult to diagnose tumours whose size are inferior to two centimetres. that generally have behind them already have a long incubation period.

The present invention reproposes amongst other things the solution of the problem of precocious detection of breast cancer through the application of an investigation method that is able to discover the presence of a tumour in its initial development phase. In particular the present invention regards a method and its relative instruments for the building of three-dimensional thermal maps that allow the identification of inflammation centres o tumour masses or whatever else with its presence within tissues is able to modify it even weakly (tenth of degrees). Explicitly referring to the identification of tumour pathologies it is detected that the tumour tissue differs from the healthy one for a series of biochemical parameters. The tumour cells present a low accumulation efficiency of the metabolic energy that is dispersed thermally, giving rise to a temperature increase of the tumour mass as that of the healthy tissues. It is furthermore acknowledged that any local inflammation cause is however linked to more or less localised temperature increases.

INVENTION PRESENTATION

The methodology that is proposed concerns the non invasive definition of the three-dimensional distribution of the temperatures within the dielectric objects, with the inclusion of biologic tissues and organs. This methodology will use sensors that are able to measure the heat radiating power emitted by the objects at different frequencies, within the range that goes from the radio waves (wave length one metre)to infrared (wave length one micron). The reception apparatus of such sensors will be directed in space according to fitting directions that will depend on the geometry and dielectric characteristics of the analysed object. Given that the effective layer thickness that contributes to radioactive emission depends on the wave length of the monitored radiation, it will be possible to rebuild the three-dimensional distribution of the temperatures, within the analysed volume, that is the value of the corresponding temperatures at small values (pixels) within the total analysed volume, measuring the power irradiated at different frequencies and placing the sensor antenna in

correspondence of a chosen set of points on the surface that circumscribes the investigated volume. Beginning from the thermal data measured at various frequencies and from various surface points, the rebuilding of the three-dimensional thermal maps of the investigated objects will be obtained through the application of opportune algorithms that will naturally take into consideration the topological data of the problem. The best approach for the solution of the problem of the rebuilding of the thermal field according to point values, initiating from integral data of the irradiated power, is based on the use of the Raley-Jeans equation, that describes the connection between the emission spectral density and the kinetic temperature of the elements of the object. On the other hand the reconstruction algorithms of the three-dimensional thermal distribution may be based on models in which the link between the emission intensities and the temperature profiles are expressed through first order Fridgolm integrals (7, 8).

The instruments, proposed in the present invention, will allow the measurement of the total emissions of electromagnetic field at various wave lengths, in the range between infrared and radio waves, and throughvarious observation directions.

It will therefore contain a series of sensors that are able to measure the electromagnetic field in specific spectral bands. Such sensors are mounted on supports that adjustable and removable in space, so as that, remaining fixed the object of which one wants which to determine the three-dimensional distribution of the temperature, the various sensors can be positioned in such a way as to measure the emission along directions that have been pre-established by the observer. The movement of the sensors may occur both automatically and manually.

The data measured by the sensors are sent through opportune interfaces to the data memorisation system that are able to re-elaborate the experimental information (total emission of electromagnetic waves of the object at various wave lengths and through various directions and/or distances), resolving integral equations with Fridgolm type methods, setting as output the three-dimensional map of the temperatures of the object. Such a map in addition to being supplied as a table can be presented on a screen or also printed as a thermal image.

An incomplete structural outline of the proposed instrument is reported in figure 1

The sensor battery (1) may be oriented on the basis of a program that the operator can elaborate during the analysis. For example, the operator, on the basis of the observations, at certain wavelengths representative of the surface thermal distribution, can determine topological parameters for the sensor movement operating at gradually growing wavelengths to better define the heat determinations of the deeper layers of the object. The output of the different frequency channels 2.1 .... 2n will be charged in command centre 3, that contains in its interior the elaboration and co-ordination unit of the entire instrument.

REFERENCES

1. R.H. Dicke, "The measurement of thermal radiation at microwavefrequency", rev. Sci. Instrum, 17,268-275, July 1946.

2. R.H. Dicke, "Microwave Radiometry", Manual of remote sensing, American Society of Photogrammery, Fall Church Va, 1975, Part 1, Chap 9, pag. 499-527

3. K.M. Ludeke et al., DE Patent. Fed. Rep. of Germany 2803480, Jan. 27, 1978

4. Troitskii, V.L. Rakhlin, Russian Federation Patent, Nizhnj Novgorod 1997

5. N.N. Holodilov, I.A. Ulianichev, "Method for the Measurement of the physical temperature"; Russian Federation Patent, n° 2124703, June 23, 1995

6. F. Bellifemine, V. Rudi, "Infrared Thermometer Comprising Optical aiming System" PN:WO9801730 AI 980115; AN: EP 9703531 970704; PR:IT MI 96A001399 960705

7. P. Bartaty, D. Solomini, "Radiometric Sensing of Biological Layer Media" Radio Science, V. 18, 1393, (1983).

8. P. Edenhofer, "Electromagnetic Remote sensing of the temperature profile in a stratified medium of Biological Tissues by stochastic inversion of Radiometric Data", Radio Science V. 16, 1065, (1981),

CLAIMS

1. Instrument for non invasive measurement of the three-dimensional distribution of the temperatures of dielectric objects, with the inclusion of human organs or other biological tissues, characterised by the fact that it uses sensors to determine the electromagnetic heat emission power in a frequency range between the radio wave frequency and the one of infrared radiation, mounted on supports that are adjustable and movable in space, so as that, remaining fixed the object of which one wants to determine the three-dimensional distribution of the temperature, the various sensors can be positioned in such a way as to measure the emission along directions that have been pre-established by the observer. The movement of the sensors may occur both automatically and manually. The data measured by the sensors are sent through opportune interfaces to the data memorisation system that are able to re-elaborate the experimental information (total emission of electromagnetic waves of the object at various wave lengths and through various directions and/or distances), resolving integral equations with Fridgolm type methods, setting as output the three-dimensional map of the temperatures.

2. Instruments for non invasive measurement of the three-dimensional distribution of the temperatures of the dielectric objects according to the second claim characterised by the fact that the maps are supplied as a table.

3. Instruments for non invasive measurement of the three-dimensional distribution of the dielectric objects according to the second claim characterised by the fact that the maps are supplied on a screen.

4. Instruments for non invasive measurement of the three-dimensional distribution of the temperatures of the dielectric objects according to the second claim characterised by the fact that the maps are supplied as thermal maps

5. Non invasive measurement methods of the three-dimensional distribution of the temperatures of the dielectric objects using an instrument of the type described in any of the claims from 1 to 4 according to the second claim characterised by the fact that it uses a reconstructive approach of the point like temperatures based on the use of the Raley-Jeans or similar equations, that uses calculus algorithms of the three-dimensional thermal distribution may be based on models in which the link between the emission intensities and the temperature profiles are expressed through Fridgolm integrals equations or by other similar equations.

6. Non invasive measurement methods of the three-dimensional distribution of the temperatures of the dielectric objects according to claim n° 5 characterised by the fact that the registration of the

thermometric data. the data registration and its handling, both automatically through opportune algorithms, apart from their specific nature.

7. Non invasive measurement methods of the three-dimensional distribution of the dielectric objects according to claim n° 5 characterised by the fact that it is used for medical-diagnostic purposes, on human internal organs.

8. Non invasive measurement methods of the three-dimensional distribution of the temperatures of the dielectric objects according to claim n° 5 characterised by the fact that the operator manually determines topological parameters for sensor handling working on gradually increasing or decreasing wave lengths.

9. Non invasive measurement methods of the three-dimensional distribution of the temperatures of the dielectric objects according to claim n° 5 characterised by the fact that the sensor handling is automatic and occurs according to pre-established programs, that can be chosen by the operator.

Abstract

The present invention concerns methods and instruments for the definition of the three-dimensional distribution of the temperature of dielectric objects, non-invasively. It is based on the possibility of measuring with extreme precision the electro-magnetic heat emission that results within the internal presence of objects with temperatures superior to absolute zero.

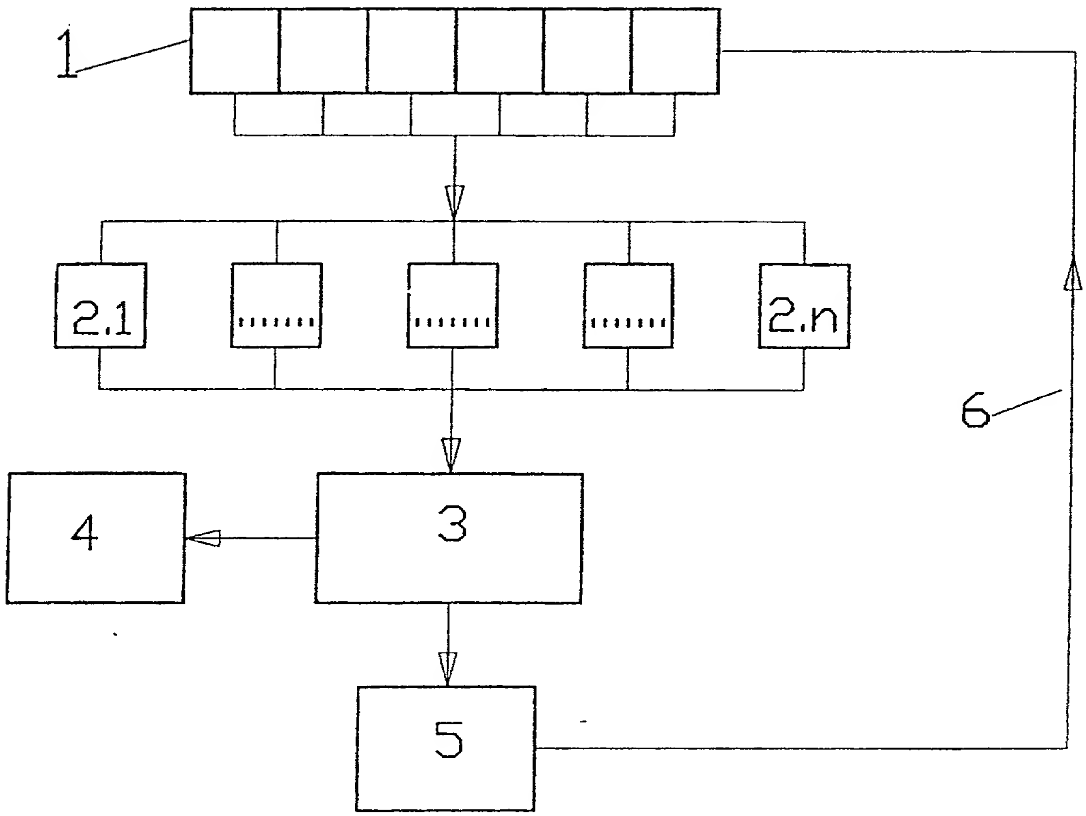

fig. 1

Docket No.
P25204 USA

OIPE JC10
OCT 0 5 2001
PATENT & TRADEMARK OFFICE

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled
METHODS AND EQUIPMENT FOR THE MEASUREMENT OF THE THREE-DIMENSIONAL DISTRIBUTION OF THE TEMPERATURES WITHIN DIELECTRIC MEANS

the specification of which

(check one)

☐ is attached hereto,

☒ was filed on **October 23, 2000** as United States Application No. or PCT International Application Number **PCT/IT00/00426**

and was amended on ______

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

(Number)	(Country)	(Day/Month/Year Filed)	Priority Not Claimed
CZ99A000010	Italy	22 October 1999	☐
			☐
			☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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